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Grubbström

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(54) **METHOD OF CLEANING A CARBON DIOXIDE RICH FLUE GAS AND A BOILER SYSTEM**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,487,576 A 11/1949 Meyers
2,741,330 A 4/1956 Kaess
(Continued)

FOREIGN PATENT DOCUMENTS

CN 101231130 A 7/2008
EP 0 162 536 1/1996
(Continued)

OTHER PUBLICATIONS

Hamid Farzan and Stanley J. Vecci et al, Pilot-Scale Evaluation of Coal Combustion in an Oxygen-Enriched Recycled Flue Gas, 2005, Clearwater, Florida USA, The 30th International Conference on Coal Utilization and Fuel Systems, BR-1764.
(Continued)

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(57) **ABSTRACT**

A boiler system (**101**) comprises a boiler (**2**) for combusting a fuel in the presence of a gas containing oxygen gas, and a gas cleaning system (**106**). The boiler system (**101**) comprises a compression device being operative for pressurizing at least a portion of the carbon dioxide rich flue gas from which at least a portion of the contaminant content has been removed, and a carbon dioxide supply duct (**142**; **143**; **145**) being operative for forwarding at least a portion of the pressurized carbon dioxide rich flue gas to at least one gas cleaning device (**108**; **110**; **111**) for being utilized as a utility gas therein.

17 Claims, 8 Drawing Sheets